VOLUME XLVI
No. 11

March 15, 1919

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Municipal Journal

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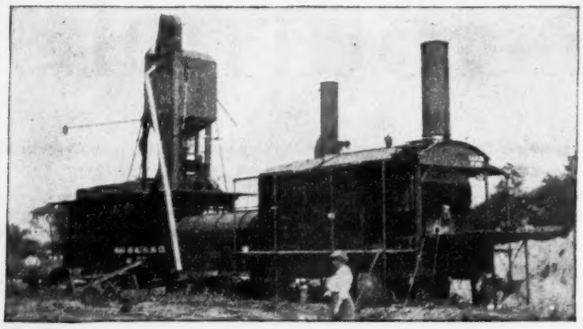

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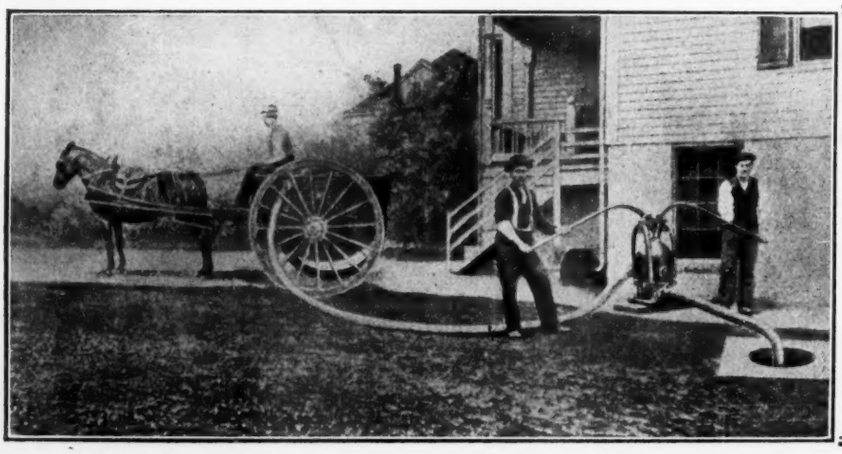

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Municipal Journal

Volume XLVI NEW YORK, MARCH 15, 1919 No. 11

USE OF RAINFALL RECORDS*

Gauges Should be Established Relatively Short Distances Apart Throughout the Country—Variation in Rainfall Rates of Different Areas—Mass Diagrams—Evaporation and Run-off.

At the December meeting of the New England Waterworks Association, there was read a letter from Robert E. Horton suggesting that an effort be made to get officials in charge of waterworks to establish rain gauges on the watersheds upon which their water supplies depend. While there are a fairly good number of rain gauges already established in various parts of New England, the number might be greatly increased to advantage, especially if they could be located in sections not already well supplied. In a paper before this society by X. H. Goodnough, it was shown that the southeastern section of New England is well supplied with rain gauges, but in the remainder of New England they are very widely separated. Many of the latter sections are well elevated and contain many streams, thus furnishing opportunities for reservoirs, dams, etc., for the development of power or water supplies.

It is proposed in this paper to give a few simple illustrations of the ways in which rainfall records may be put to practical use in the study of questions relating to water power and water supply, with a view to encouraging the establishments of additional gauges.

One advantage to be gained by having gauging stations located at relatively short distances apart would be to check the results obtained at other stations and correct any variation which may appear in the gauging due to special or unusual topographical conditions in the water shed, such as elevation; nearness to large hills, mountains, or water surfaces; directions of prevailing winds; etc. As the amount of rain that may be expected to fall on a given district is often the only basis upon which its value as a power or water producer can be formed, it follows that it is desirable to have the very best data that it is possible to obtain on that vital point.

It may be thought that with so many rain gauges already set up, especially in eastern New England, it would be easy to obtain accurate and reliable data for almost any location in that section; but anyone not familiar with the subject will be surprised and puzzled at the wide variation in the results obtained at locations not far apart, which often renders any close estimates impossible. As illustrating this fact, the following table has been prepared showing the average rainfall at various stations for a forty-year period ending 1913, and also the rainfall for the exceptionally dry years of 1880 and 1883, which for some purposes it might be desired to use:

*Paper before the New England Water Works Association, by L. M. Hastings, city engineer of Cambridge, Mass.; slightly condensed.

Average Rainfall at Several New England Localities.

Location.	Average Yearly Rainfall 1874-1913 40 Years.	Rainfall For Year 1880.	Rainfall For Year 1883.
*Manchester, N. H.	38.27	27.50	31.47
Concord, N. H.	38.63	30.48	31.35
Lowell, Mass.	42.01	35.28	39.84
Waltham, Mass	43.36	31.73	29.32
Cambridge (Harvard College)	43.49	35.22	32.65
Framingham (Sudbury River)	44.26	37.87	31.95
New Bedford, Mass.	46.65	40.06	43.51
*Providence, R. I.	47.20	41.29	39.54

*Manchester and Providence are only about eighty miles apart in a straight line.

From the above, it will be seen that even for a long-term period the average amount of rainfall at the points named varies greatly, the extreme variation being 8.93 inches or about twenty-three per cent., while for the dry year of 1880, the extreme variation is 13.99 inches, or over fifty per cent. From this it will be seen that anyone attempting to design a water power or a water supply system for a water shed at all remote from a long established rain gauge must unavoidably base his estimates upon data which have a large element of uncertainty in the makeup.

It has been stated by some writers that a rainfall record of from thirty-five to forty years makes that record fairly reliable as a basis of estimates for the expected average yield of a water shed. While this may be true in an ordinary period, an examination of the rainfall records of the last forty years of the Sudbury river water shed and others which have commonly been used in this vicinity shows that a marked change in the amount of rainfall has occurred during the last fifteen years of that period and that while the average for the forty-four years since the Sudbury river records were begun is 44.66 inches, the average for the period 1904 to 1918 (fifteen years) is only 40.97 inches.

The Stony brook rainfall record of the Cambridge Water Works in Waltham, Mass., shows a similar change. While the average rainfall for the entire period of twenty-nine years the gauge has been established—1890 to 1918—is 41.53 inches, the average for the period 1904 to 1918 (fifteen years) is 38.75 inches.

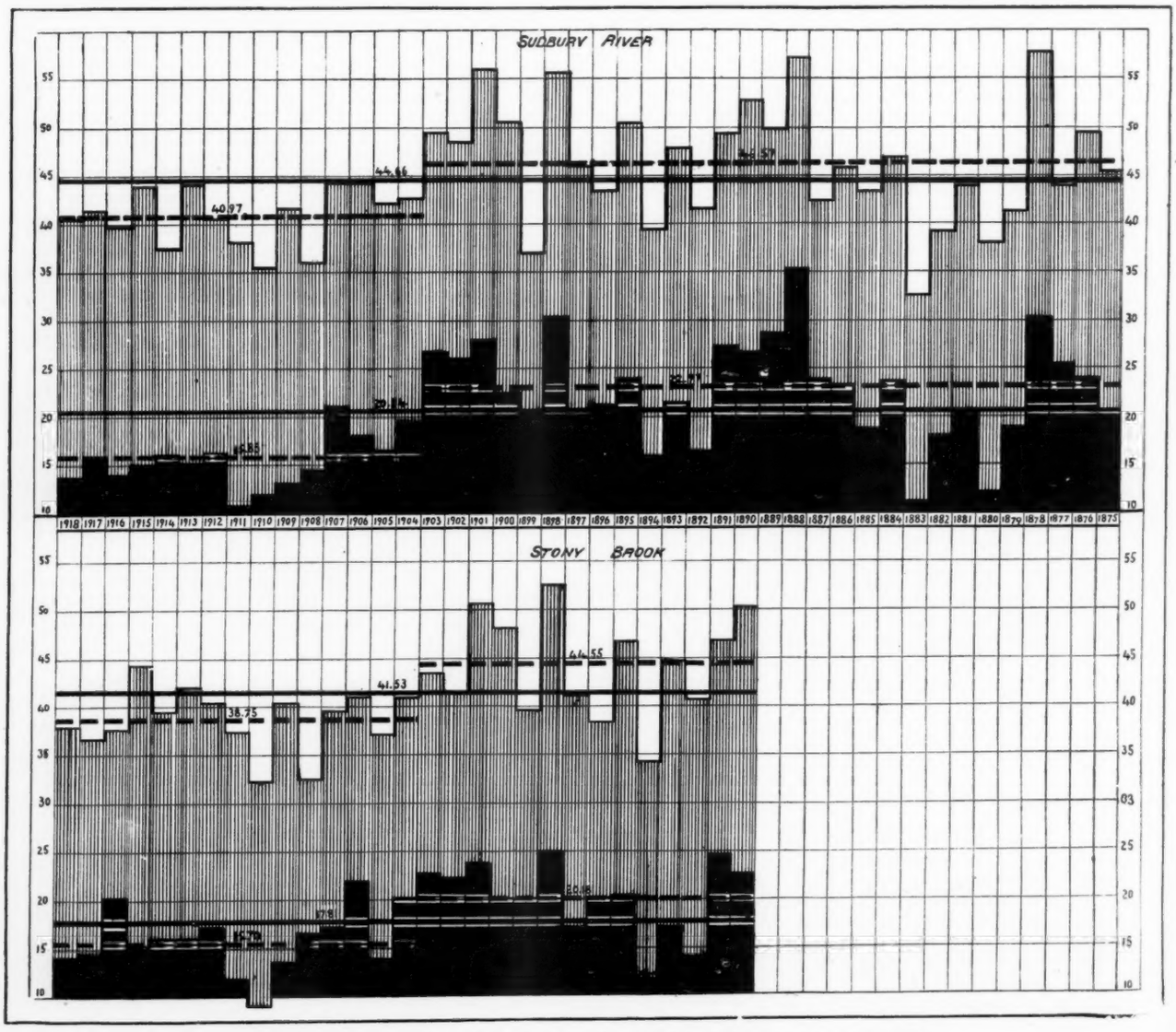
These last are remarkably low rates for so long a period and there seems to be but one period of that length of time with so low a rainfall record in this vicinity. This is in the Cambridge record of Prof. John A. Winthrop from 1760 to 1775, where the average rainfall is shown as 37.38 inches as given by Mr. Goodnough in his paper already referred to.

Still further, the record of the yield or run-off for both these areas shows a corresponding persistent decrease. While the average run-off from the Sudbury river area for the forty-four years is 20.54 inches, the average run-off for the last fifteen years is 15.85 inches. On the Stony brook area the average run-off for the twenty-nine years is 17.81 inches, and the average run-off for the last fifteen years is only 15.70 inches.

If these records are analyzed by percentages, the interesting fact is shown that in the dry periods, the *proportion* or *percentage* of run-off to rainfall is less than that in the wet periods. Thus, for the wet period in the Sudbury river area 1875 to 1903, the run-off was 49.3 per cent. of the rainfall; for the dry period 1904 to 1918, it was only 38.7 per cent.; for the exceptionally dry year of 1883, it was 34.1 per cent., and for the year 1911, it was 28.1 per cent. Similarly on the Stony brook area, for the wet period 1890 to 1903, the run-off was 42.9 per cent. of the rainfall. In other words, a *diminished proportion* of run-off. From these facts, it is evident that it may not be safe to draw conclusions even from a forty-year record, without a careful study of the records of other places and other periods that proper allowance may be made for abnormal results which may have been obtained.

There is another rather curious fact shown in the records for the year 1909 which may be noted. While the rainfall for this year, is about six inches *more* than for either 1908 or 1910, the *run-off* for 1909 is about 1.50 inches *less* than for the year 1908. The Stony brook record shows the same peculiarity—a lessened run-off in a year of increased rainfall. The explanation of this anomaly may be that the underground storage had become so depleted by the continued drought of a number of years previous that the increased rainfall for the one year failed to restore the deficiency in this storage and so could not increase the run-off for that year.

A very important and interesting question may be raised just here. Will the diminished rainfall as noted during the last fifteen years be permanent or will the rate "come back" to its old level? While no definite or authoritative answer can be given to this query, two things should be remembered in this connection. No permanent marked changes ever take place in the processes of nature without adequate cause. No such adequate cause is apparent by which the rainfall of this section could be permanently diminished; and again, in the past, marked changes have occurred in meteorological conditions, cold winters, hot summers, wet and



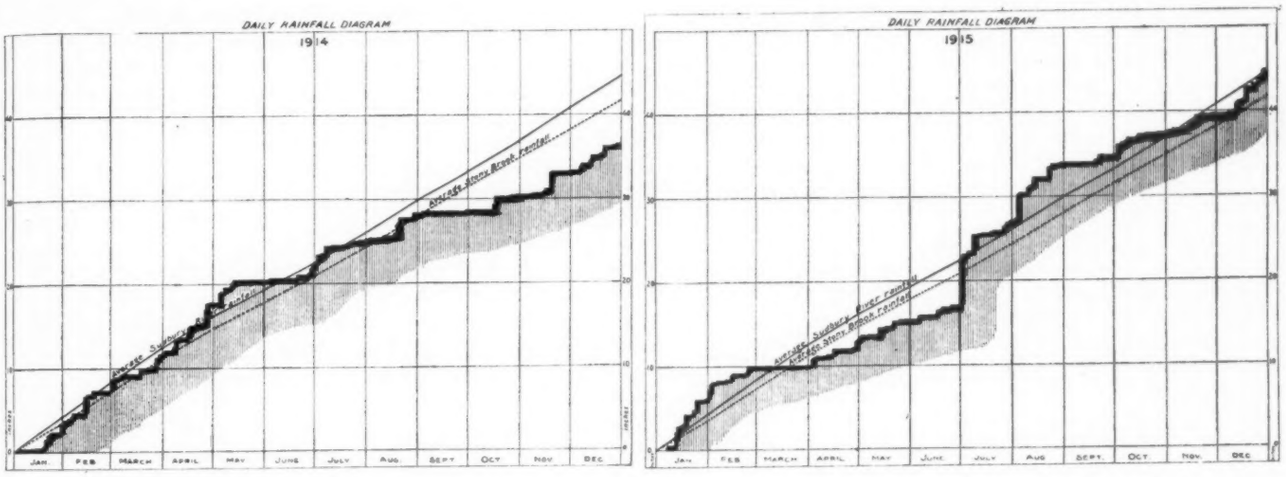
RAINFALL RECORDS, SUDBURY AND STONY BROOK WATERSHEDS.

dry seasons—some continuing for considerable lengths of time, but inevitably the balance has been restored and the general mean of conditions re-established. Even if the period of low rainfall given in Prof. Winthrop's somewhat fragmentary records be taken as reliable as showing the entire rainfall for that period, the records of other observers for following years show the amount of rainfall to be well up to or above the average.

and that long-time records obtained on or near the ground are most reliable and satisfactory.

The cost of an ordinary rain gauge (not automatic or self-recording) is small and its care and maintenance require only the attention which can be given to it by some intelligent employe on the ground, or by some resident for a nominal sum.

If it is desired to obtain automatic records of the rainfall,



FIGS. 2 AND 3—RAINFALL MASS DIAGRAMS FOR THE SUDBURY WATER- SHEDS, 1914 AND 1915.

A very practical and convenient way of using the daily rainfall records is by plotting them in the form of a mass diagram. Probably one of the most common inquiries a superintendent of waterworks has to answer is one relating to the condition of the reservoir as regards the supply in storage. Much misconception frequently exists in the "average citizen's" mind as to the amount of rain which has fallen prior to a given date and consequently as to the amount of water which has been received into the storage basins. If the returns are plotted on the prepared skeleton or frame of the diagram at weekly or monthly intervals, a glance will show the total amount of rainfall to date, and also whether that amount is more or less than the average amount of rainfall up to that time.

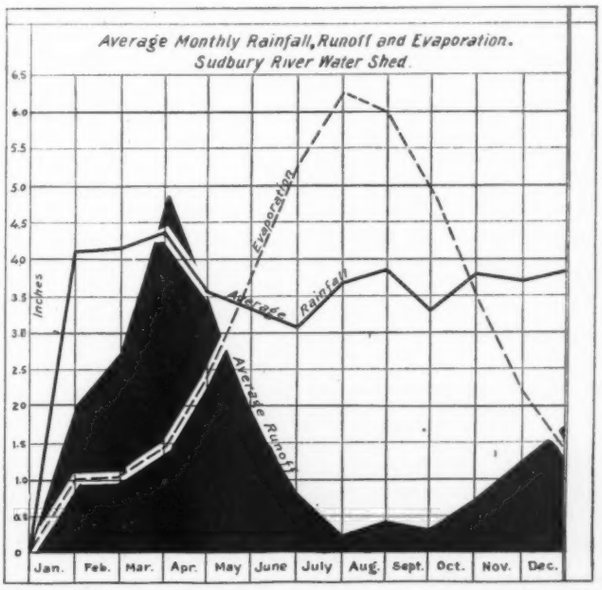
It is rather a curious fact that, taking the average rainfall for each month for a long term of years, these averages differ but little, the rainfall of the so-called "dry months" being on the average but little less than that of the wet months. The greatly increased evaporation during the hot months, together with the demands of growing vegetation, etc., makes the rainfall seem much less than it really is and also results in a greatly decreased run-off during those months.

As the evaporation from ponds, brooks, reservoirs, etc., amounts to over thirty-nine inches during an average year, it will be seen that the presence of large water surfaces in a water shed may have an important bearing on the amount of run-off to be expected from it. The accompanying diagram shows very clearly the relation between the average rainfall, evaporation and run-off as they occur in the Sudbury river watershed.

The distribution of the rainfall during the year has an important bearing on the amount of the yield or run-off. If the rainfall is largely during the season when the ground is frozen, a much larger run-off may be expected than if it occurred during the hot months, when the ground is dry and the evaporation rapid. This distribution and also the accumulated amount of rainfall to any date during the year are shown in Figs. 2 and 3.

From the above, it will be seen that rainfall records can be made to serve a variety of practical purposes, a more complicated and expensive type of gauge can be installed, and data obtained very useful in the study of many questions not covered by the mere *quantity* of rainfall, especially such as relate to the time at which the rainfall occurred and its intensity or rate per hour at any given time. These data are very interesting and sometimes are exceedingly valuable as factors in calculating the necessary strength and height of dams, length of spillways, size of culverts, damages threatened by floods, overflows or washouts, raising or lowering of the water in storage reservoirs, and a great variety of other questions of a similar nature.

If a watershed is large and the works established upon it are important and involve a large investment of capital, the establishment of an automatic rain gauge is strongly recommended.



RAINFALL, EVAPORATION AND RUN-OFF, SUDBURY WATERSHED.

A GARBAGE CREMATORY WITH SELF-RESPECT

That of Spokane, Washington, Finished in White to Compel Cleanliness, and Parking Development of Grounds Carried Out—Showers and Rest Room for Employes—Systematic Plans for Storing Materials.

By ARTHUR E. PETERSON.*

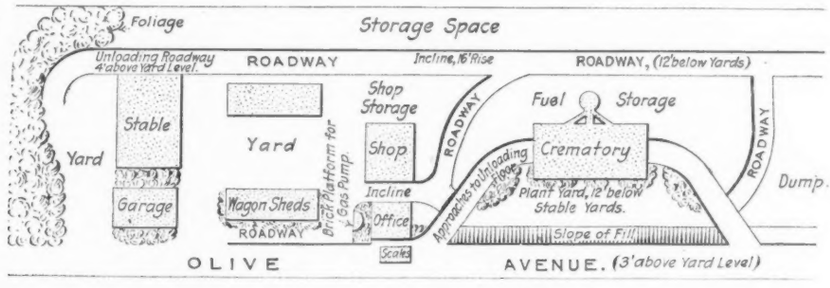
It seems strange that the average American municipality will build a beautiful city hall, well appointed and located, but will erect all other buildings required in out-of-the-way places, using bad designs and finishing in dull colors, and maintain them in a state of semi-disrepair. This is a real and serious state of affairs which calls for deserved condemnation and correction.

Because of their reputations as bad neighbors, crematory plants too often are placed in inaccessible locations and then, if the public will allow it, are neglected and abused by the responsible authorities. This condition in a great measure accounts for the notoriety achieved by the American crematory plant. Waste disposal plants are naturally the accumulating centres for wastes of all descriptions, of little or much value. The accumulations are almost invariably scattered about the plants and grounds in a haphazard manner. This practice has a very marked tendency to decrease the morale—if I may use the term—of the labor employed. The employe's surroundings have a marked influence on his attitude toward his job. To work in or about an establishment which has an atmosphere of shiftlessness, unquestionably lowers the standards of the labor done. It is so easy for men to become shiftless in their habits, careless in their methods, and consequently less efficient in their work and of decreased value to themselves and to their employers.

finished in white—an innovation in buildings of this type. There was adverse criticism expressed—white shows dirt too readily; accumulated filth in the vicinity of white stands out too distinctly; white grows dingy more quickly than any other finish which might be selected. These were the important reasons given against the proposed use of white as a finishing color. Paradoxically these were the very reasons for selecting white; the interior walls were not to be allowed to become dirty, there were to be no accumulations of filth, and a dingy finish could be corrected by a coat or two of paint.

The buildings were but a part of the general scheme to improve the working conditions of the waste collection and disposal division. Other elements of the scheme were the installation of showers; the fitting up in the stable of a lounging room, where the employes might heat and eat their lunches in comfort; the setting aside of certain spaces of land for storage purposes, and the parking of the grounds.

After the buildings were finished, the first step taken in working out the scheme of plant and labor improvement was to arrange proper storage facilities for equipment when not in use, and for the various articles of potential value, such as wood, iron, etc., which are collected. These storage spaces were so arranged that, although necessarily somewhat unsightly, they are not conspicuous, but are easily accessible. Rules have been



PARKING SCHEME FOR SPOKANE CREMATORY GROUNDS.

The crematory plant of Spokane, Wash., is located accessibly, being approximately one mile from the centre of the city. It has no neighbors, situated as it is among railroad yards, but fortunately it has developed a sense of self-esteem.

It was with a desire for experimental application of certain theories of operation that the plans for the Spokane crematory plant and the associated group of buildings were developed. It was hoped that the plans could be so made and executed as to do away with the erroneous idea that a crematory plant must be unbeautiful and a constant insanitary nuisance. Therefore, a scheme for the promotion of cleanliness and beautification was evolved in conjunction with the plans drawn for the buildings. The plans called for substantial buildings, though severely plain, of good design. Red brick and concrete were used in construction. The finish was entirely in white. Gables, eves, window and door frames, as well as the interiors of all the buildings, were

promulgated covering the care of equipment and the proper storing of wastes. The observance of these rules has brought order out of a former chaotic state of affairs and has developed in the labor that desire for order and regularity which are the initial steps leading to efficiency.

The idea of combining a decorative scheme with the practical arrangements of the grounds was next suggested. The scheme of beautifying the grounds by planting shrubs was not frowned upon, but it did become a subject for our local jokesmiths. The public seem to find it difficult to associate anything well ordered or beautiful with a waste disposal plant. The City Commissioners, knowing the situation of the plant—bounded on one side by a dump and the Spokane river, and on the others by railroad yards—felt that it was an almost hopeless task to attempt to adorn and keep orderly the grounds and buildings, but their consent to the project was given gladly.

J. W. Duncan, superintendent of parks, developed a parking plan for the grounds. The scope of the plans

*Superintendent of Crematory Division, Department of Public Works, Spokane, Wash.

was somewhat limited, because of the peculiar aspect of the land and because of the excessive expense involved. The crematory group of buildings were erected on what was formerly the bed of an inlet of the Spokane river. The crematory building is situated directly on this bed. The balance of the buildings are located on made ground, the level of which has been raised about twelve feet above the floor level of the plant building. The soil at the plant consists of coarse gravel. The soil of the stable yards is the usual dump material of the average city. These soil conditions made it necessary to haul, a distance of three miles, all dirt required for planting purposes. The beds were prepared last spring and most of the shrubbery planted. Some of the later planting did not survive, but in general the plants have done well. The planting will be completed this spring. Quickly-growing shrubs, small trees and climbing vines, mostly roses, have been utilized. The dominant idea in arranging the plants has been to form screens. The vines have been so placed as to cover walls and the frame work of the approaches to the unloading floor of the crematory building, and to spread and cover the bare earth on the banks created by the difference in levels. The trees have been planted so as to break the monotony of bare walls where vines cannot be trained. The shrubs have been planted very thickly and will be thinned as they attain growth. It will require the passing of a few years for the parking to have reached its proper growth and development. This spring, to supply color to the landscape, flowers (annuals) will be planted.

We have found in a small way what an attempt at securing cleanliness, order and beauty means in the accomplishment of our day's work. Private enterprise has demonstrated beyond all question that it is good business properly to plan and carefully maintain its properties. We may see, scattered about the country, branch packing establishments, milling concerns and oil stations of the larger corporations that are examples of a new idea in plant construction and property maintenance. These institutions, beautiful in a simple and practical way, with their parking and yard features carefully planned and cared for, provide workshops which not only seize the interest and increase the value of their employes, but which also create among their patrons and the community at large that intangible but invaluable something called good will.

Would it not be good business for the American municipality to emulate the private corporations, whose well-ordered establishments stand as monumental object lessons for those who will but look? In the northwest there has been an awakening among the city authorities and a great deal of intelligent effort has been expended in the solution of this important problem of ground, building and labor betterment. A beginning has been made and an example furnished which it is hoped will lead to greatly improved conditions everywhere along these lines.

THE HETCH HETCHY RECORDS.

In regard to the following letter we regret that the statements made by our informant so distorted the facts, as explained by Mr. O'Shaughnessy. We are giving his letter as prompt and full publicity as possible.

Editor, Municipal Journal, New York City,

Dear Sir: In your issue of February 15, 1919, on page 137, there is a supposed record of decision by the Superior Court of San Francisco in connection with certain data desired by a group of people known as the San Francisco Bureau of Governmental Research.

The statements contained in your paragraph are untruthful and misleading in some respects. The Civic League of Improvement Clubs did not get behind this organization in its alleged fight. On the other hand, they made an investigation of records and data relating to the Hetch Hetchy project through a committee of five and made a favorable report as to the conduct and management of the project back to their organization. In the court proceedings the city's attorney made offer of display of all records which were public, in the pleadings presented in the case. The Judge's decision that such records must be made available is a profitless victory for the litigants. In the Judge's further ruling there was excepted from such records "all confidential reports, estimates or data collected or compiled by assistants or other engineers employed for the purpose for the use of the city attorney of the city and county of San Francisco or other attorney at law acting for said city and county in advising the defendants in respect to their official rights and action."

This decision in effect sustains the city engineer in his attitude for the protection of the city against various interests which have for years been endeavoring to obstruct the enterprises of the city of San Francisco and the Hetch Hetchy project in particular.

I regret that your correspondent should have distorted the information and findings above and hope the foregoing will put you straight on these matters.

Very truly yours,
M. M. O'SHAUGHNESSY,
City Engineer.

GUARANTEES FOR PAVING

Opinions of Several City Engineers as to Their Desirability—Duration of Guarantee—For What Kinds of Pavement Desirable.

The subject of guarantees for paving streets and highways was reported upon by a committee of the American Road Builders' Association last month and considerable interest was manifested in the subject. A few weeks ago, in sending out a questionnaire to the various cities concerning paving matters, Municipal Journal asked the number of years of guarantee that was required by each city on each of the several kinds of pavement, and also the two questions: "Do you consider guarantees desirable for each of the kinds of pavement named above? If not, for what kinds is it not desirable?" Something over 400 cities have answered the questionnaire up to this time, 246 of them replying to these two questions. Quite a number of the remaining cities reported that all of their paving was done by day labor and consequently the subject of guarantee did not interest them. Also, several reported the number of years' guarantee required for the different kinds of pavement but expressed no opinion as to the desirability of the practice.

It might be assumed, perhaps, that where guarantees were asked for, the city engineer was in favor of them. This does not follow necessarily, however, for in some cases the city ordinance requires guarantees, in others the requiring of guarantees has become established and no feeling against them has been aroused sufficiently strong to result in a discontinuance of the practice. Further evidence of this occasional condition is furnished by the fact that sixteen different city engineers whose cities require guarantees reported that they personally were not in favor of them.

In summarizing the opinions of the city engineers, we have divided them into three classes—those who did not believe in guarantees for any kind of pavement, those who believed in requiring guarantees for all kinds of pavement, and those who believed guarantees desirable for some kinds of pavement but not for others. The replies were further classified by states, and these states grouped by districts.

So classified and grouped, we find the following results as to the opinions held in the different sections of

the country: In New England four did not believe in any guarantee, one believed in guaranteeing all pavements and six in guaranteeing some pavements. In the Middle Atlantic states fourteen would guarantee no pavements, twenty-four all pavements, and fourteen some pavements. In the South Atlantic states, the figures were three for no pavements, six for all pavements and one for some pavements. In the Gulf states three for none, five for all and one for some. In the Central states there were twenty-four for none, thirty-five for all and nineteen for some. In the North Central states, eleven for none, eighteen for all and seventeen for some. In the Rocky Mountain states there were three for none, ten for all and two for some. In the Pacific Coast states, seventeen for none, one for all and one for some. Of six Canadian cities, two favor guarantees for none, three for all and one for some. Taking the total of the entire country, we find that 81 were opposed to guarantees for any kind of pavement, 103 would require guarantees for all kinds, and 62 for some kinds of pavements.

One rather striking feature of these figures is the slight difference between the proportions, in the different geographical sections, of those favoring guarantees for some or all kinds of pavements and those who do not favor guarantees at all. The last form 33 per cent of all of those reporting, and if we exclude the Pacific Coast states, we find approximately this percentage in each of the several sections of the country. The percentages of those not approving of any guarantee figure out as follows: New England states, 36½ per cent; Middle Atlantic, 27 per cent; South Atlantic, 30 per cent; Gulf, 33½ per cent; Central, 31 per cent; Northern Central 24 per cent; Rocky Mountain, 23 per cent; Pacific Coast, 89 per cent; Canada, 33 1-3 per cent.

It is possible that a few of those listed as favoring guarantees for all pavements would really except certain kinds, since a number of replies to the questions quoted above were confined to the word "yes." If about half of those so replying should be classed as favoring guarantees for some pavements only, we would have practically the same number in each of the three classifications.

REASONS FOR OPPOSING GUARANTEES.

Some of those who did not favor guarantees explained their opposition briefly, a few of these explanations being as follows: "If properly constructed, pavement will outlast guarantee and cost of guarantee be unnecessary." "Guarantees are never satisfactory." "Good contractors charge a liberal amount for repairs, and if this amount were used for inspectors a better pavement could be obtained." "First-class inspection is preferable." "Maintenance by the city is cheaper than paying for a guarantee." If we are not sure a pavement will last more than five years we do not want it, guarantee or no guarantee." "Rigid inspection is both cheaper and better." "Experience in enforcing guarantees shows that they do not amount to anything." "We cannot enforce guarantees." "With no guarantee and proper supervision we get lower prices and better work." "Not desirable, as a competent engineer, unhampered by politics, will insure good work." "Has always proved costly, and is uncalled for if the work is properly done." "No guarantee compensates for poor construction, and it adds greatly to the cost." Two or three are in favor of requiring guarantees only for untried, new materials or methods or proprietary pavements.

Those who favor guarantees for some kinds of pavements and not for others vary widely in their selections of kinds of pavements for guarantee. Some would require guarantee for brick, asphalt, wood block, etc., but not for bituminous or broken stone pavements, while others would require guarantees for the latter and not for the former. One city believes a guarantee especially necessary on bituminous pavements, another requires a guarantee on all except bituminous pavements. Possibly the greatest concensus of opinion is on the desirability of requiring no guarantee for gravel roads. Nearly as many would omit macadam from the list, while several would omit granite block, and next in order probably would come concrete. Apparently all of the cities that have used asphalt and favor guarantees at all, would require them for asphalt. In the case of brick, there are approximately the same number who would require guarantees for this pavement as those who would omit brick from the list of guaranteed pavements.

LENGTH OF GUARANTEE.

As to the length of guarantee, this varies from nine months to ten years. Only nine cities require a ten-year guarantee, and several of these require it for only one or two classes of pavement. Five require it for sheet asphalt, five for brick, three for concrete, two for bituminous concrete, and one for stone block. Five years is the most popular period, this being reported in 100 cases. One year was reported in 32 cases, two years in 13 cases and three years in 13 cases. Four are in favor of a one-year guarantee, although their cities are requiring guarantees for longer periods. One would require one year on bituminous pavements, macadam, gravel and concrete, and not more than two years on brick, stone and wood block and asphalt. Another would require one year on sheet asphalt and block pavements and five years on the other kinds. Another would require five years on asphalt pavements and concrete and no guarantee on other kinds. Another, five years for asphalt, brick, wood block, bituminous concrete and bitulithic, and one year for bituminous and water-bound macadam and concrete.

The above shows that the ideas of the several engineers as to the purposes of a guarantee differ widely. Those who would require a longer guarantee on pavements that are less durable probably do so with the idea that defects in those pavements are likely to occur at any time prior to their reaching a condition requiring renewal, while pavements like stone block or brick are more likely to reveal defects of workmanship during the first year of use. On the other hand, those who would put a five-year guarantee on brick or stone block and a one-year on bituminous macadam possibly assume that a reasonably good pavement of each kind should last for the period of the guarantee without showing any appreciable wear, and therefore the contractor should be willing to give such a guarantee without adding anything to the price of his bid. Others appear to argue that with reasonably careful inspection they can obtain a brick or stone block pavement that will last for five years and it is therefore unnecessary to call for a guarantee on such pavements; but that defective places are more difficult to avoid by inspection in the case of waterbound macadam or bituminous pavements, but are apt to appear during the first season or two, and that, therefore, guarantees are desirable in order that the contractor may be required to repair them. Possibly we misinterpret the reasonings which form the basis of the decisions of the several engineers as to requiring guarantees on the different classes of pavement, but the above suggest themselves to us as probable.

The report on this subject of the committee of the American Road Builders' Association was printed in full in last week's issue. A discussion of the matter of guarantees will be found on the editorial page of this issue.

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City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

ARE OUR CITIES CLEAN?

The catch-all alley that formerly could be found in so many cities, and was a disgrace to them, is rapidly disappearing. Instead of throwing ashes, rubbish and even garbage over their rear fences, householders are now required to place them in receptacles, to be removed by the city; and in many cities open fences are required between the alley and the abutting lots, so that sunlight can reach the former to dry and purify it, and so that collections of refuse there can not be hidden from the occupants of the neighboring houses.

But how about the city itself? Will the place to which it removes the collected refuse stand inspection? In too many cities the dumps, garbage disposal plants and other places where refuse is deposited are a nuisance, greater than were any of the alleys because on a larger scale. Of course no district with any "pull" will permit such a fly-and-stench-breeder and eye-sore within its limits, so it is located among ignorant foreigners who should be encouraged to cultivate American ideas of cleanliness instead of driven to even lower depths of physical and moral degradation. Or the refuse is hauled far beyond any settled part of the community, which additional hauling costs as much as all the rest of the collection service combined.

The buildings devoted to these and even to less unpleasant purposes, and the grounds around them, are generally given no attention or thought whatever that has for its purpose the mitigating of the forbidding aspect which they can too readily assume. Shapeless, unpainted, dirty buildings, surrounded by heaps of ashes and rubbish and pools of stagnant water, seem to be considered appropriate for refuse disposal and sewage treatment plants, and even for water works pumping stations and the stables and yards of the street department in some cities.

Under such conditions must labor every day citizens whom we are endeavoring to educate and train into sanitary ways. They are told that their yards and houses must be kept clean, but spend half of their waking hours in filthy surroundings maintained by the city itself, and are sent to their homes with clothing and persons grimy and greasy. Is it a wonder their homes are grimy and greasy too?

This is unnecessary and a disgrace. On another page of this issue is presented a contrasting picture. Spokane's garbage disposal plant is located among trees, shrubbery and flowers; the trim of the buildings is kept painted white so that dirt can not exist undetected; ashes and other bulky materials that must be stored are kept in neat piles screened by trees. The men must, even in such surroundings, become more or less dirty; but showers and dressing rooms are provided so that they can leave the plant for their homes with clean faces, hands and clothing and a feeling of self-respect that must have its effect not only in cleaner homes but in better morals and modes of living generally.

Such things cost a little more in dollars—so do clean streets, attractive residences, schools and other things that go to make up civilization. Who can say what the other things, the ugly, filthy, nauseous things that we permit and are disgraced by, cost us? The men we condemn to such surroundings are a part of us. At any time, through devious ways, their degradation may react upon the entire community. Until these spots are cleaned up, our cities will not be clean nor free from the debasing influence that they exert to some degree upon every one even remotely connected with them.

THE QUESTION OF GUARANTEES.

From replies of a large number of city engineers which are summarized elsewhere in this issue and from the discussion of the subject at the convention of the American Road Builders' Association, it is apparent that there is by no means a consensus of opinion as to either the principle on which the requiring of guarantees for pavement should be founded, or the desirability of requiring any guarantee at all. The committee of the association referred to apparently favors requiring a guarantee on every kind of pavement, but of the engineers whose opinions were obtained by Municipal Journal, only about one-third were of this opinion, about one-third would require guarantees on some classes of pavements but not on others, while the remaining third were not in favor of guarantees on any pavements.

If or when a guarantee is required, we believe that the basis set forth by the committee in its report is the proper one to use in determining the guarantee conditions; this being that the purpose of the guarantee is not to require the contractor to maintain the pavement, but rather to require repairs wherever the pavement was not constructed properly; the life of the guarantee being set at such duration that, if the pavement be well constructed, no repairing will be required during such period. If this theory could be embodied in a practical working guarantee, a contractor would be reasonably sure that, if the material and workmanship employed by him in constructing a given pavement were all that they should be, he would not be required to give any attention or incur any expense for the maintenance of the pavement after its construction had been completed.

This principle has the support of court decisions in many of the states, which decisions have been rendered in cases where the construction of the pavement is paid for in whole or in part by assessing abutting property, and the law requires the maintenance of the same pavement to be paid for out of the public funds. In this case, it is apparent that, if a guarantee requires a contractor to maintain a pavement during a longer period of years than a reasonably well-constructed pavement of this kind could be expected to give service without requiring any repairs, such a guarantee is one calling for maintenance in addition to faithful and adequate construction, and that therefore the charge which the contractor makes or should make for agreeing to repair the

pavement during its later years is a maintenance cost and not one of construction.

Aside from the legal reason just stated, there is perhaps no special reason why a city can not include with its construction bid a bid for maintaining the pavement for a series of years; the question is pertinent, however, whether maintenance so paid for would not be more expensive than if it were arranged for in some other way. In some cases there would be little question of this if the contractor bid intelligently, for unless he were sure that he would be doing work and have a plant in the city in question during the entire period of the contract, he would realize that the making of repairs at short intervals during the later years of the guarantee might prove very expensive to him.

It being generally admitted that it is desirable in most cases to provide a guarantee solely for the purpose of insuring that the materials and workmanship comply with the specifications, the question then arises whether this or some other method will best secure this end, everything being considered. There are at least two other factors that play a part in securing good work by contract, these being the inspection of the materials and workmanship by agents of the city or other "party of the first part," and the desire of the contractor to build up for himself a reputation for doing good work. Some contractors take no thought of their reputation, but the future career of such is sure to be precarious. Others may desire to secure such a reputation but are lacking in ability. There are fortunately an increasing number of contractors who have established and are continually adding to their reputation for taking a pride in their work and succeed in the great majority of cases in doing every job satisfactorily. It cannot be expected that such a contractor can be obtained on every contract at present, however, and it would appear therefore that reliance must be placed chiefly upon either a guarantee or inspection; and when the guarantee is omitted, inspection must form the chief reliance.

Inspection involves competent inspectors working honestly and faithfully in the interest of the city. Such men are none too numerous and demand good salaries. In some classes of pavement several such inspectors would be necessary, some at the plant where the materials are prepared and others on the street where the pavement is laid. The cost of thorough inspection would therefore be considerable. It is a question to be considered for each contract or class of contracts whether the cost of inspection would be greater or less than that of the guarantee. Also, whether politics or other influence will interfere with securing such rigid inspection.

In this connection it should be considered that the cost to the city of the guarantee frequently if not generally does not end with the sum added to the contractor's bid but, if it should be found necessary to collect from the contractor or his bondsmen, there will probably be legal costs which may amount to a considerable figure, with the added possibility that the case may be decided against the city. In fact, some cities are convinced from their experiences that, considering the shrewd lawyers that are retained by the bonding companies, the chances are largely against the city in any suit of this kind. Taking these things into consideration, many engineers and other city officials have come to the conclusion that adequate inspection, even though it may be expensive, is less so than collecting on guarantee bonds.

There is another consideration involving both law and justice to the contractor. The representative of the city prepares the specifications and dictates every detail of the construction of the pavement. The contractor must build the pavement exactly as the city directs and, having done this, is asked to guarantee the wearing qualities of the pavement. The pavement may prove defective through fault of the contractor, but on the other hand such defects may be due to faults in the city's plans; or they may be due to an increase in traffic which neither contractor nor city could foresee. It is in no sense the contractor's business to consider future traffic conditions however, since these should be provided for in the designing of the pavement, which is done by the city. Moreover, there are other conditions more or less under the control of the city and not at all under that of the contractor, such as the opening of the pavement for laying pipes or repairing the same.

It would seem, therefore, as though the city should assume responsibility not only for the plans but also for changed conditions which might render the plans inadequate, while the contractor is responsible only for the faithful carrying out of the specifications and plans. That, therefore, at least two-thirds or three-fourths of the responsibility for the durability of the pavement should rest with the city, and that it is an injustice to ask the contractor to assume all of the responsibility. It would seem that any contractor who does assume all of the responsibility is gambling on at least three-fourths of it, unless he is himself sufficiently informed in engineering matters to judge of the adequacy of the plans and specifications upon which he is asked to bid. Some have said that the contractor should have such knowledge and should pass judgment upon the city's specifications and, if they do not seem to him to be satisfactory, that he may then refuse to bid upon them. But it seems to us that a contractor cannot justly be assumed to have as much expert knowledge in this matter as an engineer, any more than an average engineer should be expected to make a successful contractor.

The chief argument in favor of guarantee seems to be that, under present conditions, inspectors in many cities are apt to be chosen for political reasons rather than for their ability to secure good work, or for other reasons are incompetent. We believe that this to a certain extent is true because their service is not looked upon as a very important one; but that if the officials realized and the inspectors were given to understand that faithful and competent service is as important on the part of the inspectors as of the engineer, if good pavements are to result, there would be little difficulty in securing a great improvement in the inspection service.

CREEK BANKS FROM INCINERATOR REFUSE.

The following letter was sent in reply to an inquiry addressed by us to J. F. Byxbee, Jr., city engineer of Palo Alto, Cal. About two years ago Municipal Journal published a brief note concerning this use of incinerator refuse by that city, and desired to learn how satisfactory it was proving with time:

Municipal Journal, New York City.

Gentlemen:

The city of Palo Alto, California, has operated an incinerator plant since 1912, and there is a residue from this plant consisting of ash, clinker, tin cans, broken crockery, glass, and old baling wire, amounting to about one large wagon load per day, weighing an average of 4,200 pounds.

We first attempted to dispose of this material by using it as a base on which to build gravel or macadam roads, but this did not prove a success except in minor instances, due to the limited supply.

Our next idea for deriving value from this product was to use it for reclaiming ground along the banks of a creek which flows along one of the boundaries of the city for about two miles. This creek has an average cross-section

about 60 feet wide at the top and 20 feet wide at the bottom and from 20 to 25 feet deep. In summer it is dry, but in winter it runs as much as two-thirds full for short periods. The banks are composed of gravel, clay and fine silt and naturally the erosion is very great during flood periods. There are places where as much as a quarter of an acre of soil to a depth of 20 feet has been removed in a season.

In filling these washes with the refuse from the incinerator, we dress the slope to an angle of about one to one and thoroughly wet down the mixture of ash, tin, clinker, etc., to produce a compact fill. When the fill is completed, we cover it with a thin skin of earth and manure to hide its unsightliness and to induce the growth of grass and shrubs. By this procedure the creek bank is returned to its original location and in several years the growth on the fill becomes rank enough to take on the appearance of the undisturbed banks immediately adjacent.

Since starting this work we have filled two large and important areas and are now proceeding on a third.

The material resists erosion very well and becomes more thoroughly set in place as it ages. Our confidence in its ability to hold the stream in line has increased greatly, and it is the only inexpensive construction we have tried thus far which has withstood the floods. Of course, I do not wish to imply that this material will permanently resist the erosive action of these flood waters, but from observations covering three years we feel that we are disposing of the material from the incinerator to advantage in this way.

Very truly yours,

J. F. BYXBEE, Jr.,
City Engineer.

LABOR CONDITIONS IN THE UNITED STATES

Information and Opinions Collected from State Highway Departments, Cities, Contractors, and the Department of Labor—Emigration of Laborers.

A committee on "Sources of Supply of Unskilled Labor for Highway Work," of which the chairman was Paul D. Sargent, chief engineer of the Maine State Highway Commission, presented a report to the convention of the American Road Builders' Association that embodied figures and opinions from federal, state and city officials and contractors on this subject, from which it drew the following conclusions:

"From the reports furnished by state highway departments and contractors, suplemented by the positive statements by officials of the War Labor Policies Board, and pending legislation to prevent a period of unemployment, your committee is forced to the conclusion that there will be a sufficient supply of unskilled labor for highway projects during the coming season and at wages slightly less than those prevailing during the season of 1918."

It made efforts to learn the condition of the unskilled labor market for the years immediately succeeding the close of the civil war, but was able to learn little or nothing from any records that could be found at Washington. Concerning present conditions it reported as follows:

SURVEY OF LABOR CONDITIONS.

A questionnaire was sent out to all state highway departments, to the city engineers of all cities having a population in excess of one hundred thousand, and to many of the large road-building contractors throughout the country. Replies to this questionnaire have been received from thirty-nine of the forty-eight state highway departments, from fifty-four of the eighty-two cities to which it was sent, and from twenty-four road contractors.

The questionnaire asked for information as to the number of hours for a day's work, the rate of pay per hour for common labor from 1912 to 1918 and asked what would be the probable rate for common labor for 1919, 1920 and 1921. Inquiry was also made as to the apparent available sources of supply of common labor for the present season. Suggestions were asked as to additional sources of supply if there did not appear to be a sufficient supply in sight. We also asked if state labor exchanges had been used where established and with what result, and concluded the questionnaire by asking for information as to the number of common laborers required for construction work during the season of 1919.

From the replies to our questionnaire, which have been tabulated, we extract the following information:

Replies from State Highway Departments: Thirty-nine state highway departments made replies to our questionnaire. As some of the departments are only two years old we have not used their replies in figuring average rates of wages.

In 1912 the average rate per hour as reported by twenty-seven states was $.188, while in the same year Georgia was paying $.09 and Nevada was paying $.40. Only six states were paying $.25 or more and ten states were paying $.15 or less—the most of them less. In 1913 the average as reported by twenty-eight states was $.20. In 1914 the same states reported an average of $.205, in 1915 of $.225, in 1916 of $.2585, in 1917 of $.303, and in 1918 of $.39. The highest rate for 1918 is reported by Oregon and is $.58. The lowest is by South Carolina and is $.18 per hour.

Twenty-seven states replied to our question as to probable wage per hour in 1919. The average of these replies gives a rate per hour of $.352, which, compared with the average of $.39 for 1918, shows a slight decline. Fifteen states think the rate for 1921 will be slightly less than in 1920. The other states do not venture a guess.

Thirty states think labor supply will be more plentiful in 1919, 1920 and 1921 than during the past three years. Twenty of these states give as their reason the ending of the war, with return of soldiers, closing of war industries, munitions plants, stopping of shipbuilding, etc. West Virginia thinks prohibition will put a great many men at work who never worked before. Several states report an over supply of labor now.

Suggestions for additional sources of supply of common labor are as follows: Seven states suggest use of convicts; five suggest importing Chinese, and five suggest Mexicans; five suggest general or restricted immigration from Europe. Seven states report sufficient or too much labor now.

Fourteen states have state labor exchanges. Five states have secured labor through these exchanges, but only three report good results. Other reports are as follows: "Not good for common labor;" "Not very good;" "Indifferent;" "Got some labor;" "No good."

Twenty-eight states estimate their requirements of common labor for 1919 as 160,900 men.

Replies from Cities: Fifty-four out of eighty-two cities have replied to our questionnaire. Forty-six furnish information as to wages for all years from 1912 to 1918. Taking the year 1912, Spokane, Washington, reports $.37½ per hour, which was the highest, and Birmingham, Alabama, with $.14 was the lowest, while the average rate for the year was $.234. In 1913 these forty-six cities report an average wage of $.238 per hour. In 1914 the average was $.245; in 1915, $.255; in 1916, $.276; in 1917, $.312; in 1918, $.384. Boston, Massachusetts, reports the highest rate for 1918. It is $.52½ per hour. San Antonio, Texas, had the lowest for the year, $.25, while Atlanta, Georgia, and New Haven, Connecticut, both report a wage of $.28.

The average wage which forty-eight cities expect to pay in 1919 is $.384, which is the same as the average for 1918.

(To be continued)

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on muncipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Paving Outlook:

Paving Outlook for 1919. Reports by paving officials in all sections of the country, giving their opinions on the subject as formed during the past two weeks; effect of war on 1918 paving and present prices. 7,700 words. Municipal Journal, Feb. 22. 10 cts.

Statistics from Cities. From information received from city engineers of about 300 cities as to amount of each kind of pavement that should be constructed, resurfaced or repaired in their respective cities this year. 700 words. Municipal Journal, Feb. 22. 10 cts. (To be continued.)

$25,000,000 Federal Aid for Highways? So Says Unofficial Report from Ottawa. 800 words. Canadian Engineer, Feb. 6. 15 cts.

British Program for Road and Bridge Work. Text of circular sent by secretary of the Road Board to local authorities outlining plans for 1919-20. 1,500 words. Good Roads, Feb. 8. 10 cts.

Colorado to Build Roads. Bond issue of $20,000,000 for future work and expenditure of nearly $1,500,000 in 1919 included in state program for highway work. 2 ills., 800 words. Good Roads, Feb. 15. 10 cts.

The Manufacturers' and the Contractors' Point of View. Manufacturers of paving material shares the belief of all engaged in highway and [illegible] of construction is before the country. By M. B. Greenough, ass't secy. National Paving Brick Manufacturers' Ass'n. 800 words. Municipal Journal, Feb. 22. 10 cts.

An Enlarged Plan for Road Work in Virginia. Part of an address at the meeting of the Virginia Good Roads Ass'n by G. P. Colaman, state highway commissioner, dealing with future plans for the development of Virginia's highway system. 2,000 words. Good Roads, Feb. 1. 10 cts.

To Pave or Not to Pave? Editorial on the urgent need of paving improvements throughout the country and the advisability of starting work promptly. 1,500 words. Municipal Journal, Feb. 22. 10 cts.

Construction Methods:

Method Employed in Minneapolis in Constructing Smooth Surfaced Concrete Base for Wood Block Paving. Difficulty of getting smooth base; use of templates and roller. By Ellis R. Dutton, ass't city engr., Minneapolis. 2 ills., 600 words. Municipal and County Engineering. February. 25 cts.

Wood Block Pavements at Lakewood, O. Method employed in laying block on pitch cushion; joints filled with pitch to one-third their depth. By E. A. Fisher, city engineer, Lakewood, O. 1 ill., 1,300 words. Municipal Journal, Feb. 22. 10 cts.

Pavement Foundations. Editorial on the necessity of adapting thickness of pavement base to load to be carried or to nature of soil. 400 words. Municipal Journal, Feb. 1. 10 cts.

Road Building Materials Supply Solved by System. Wisconsin county eliminates delays and demurrage; contractors selected for past record; cost-plus-profit contract. By W. J. Driscoll, ass't commissioner of highways, Outagamie county, Wisconsin. 2 ills., 2,200 words. Engineering News-Record, Feb. 6. 20 cts.

Machine for Removing Sheet Asphalt Pavement from Between Street Car Tracks. Self-loading outfit for tearing up asphalt pavement between tracks. 1 ill., 200 words. Engineering and Contracting, Feb. 19. 15 cts.

Base Construction on Steep Grade. Method of placing concrete by means of chute laid down hill on a 26 per cent. grade. 1 ill., 100 words. Municipal Journal, Feb. 8. 10 cts.

Paving Finances:

Assessments for Street Improvements. Various classes of improvements and services for which different cities assess the cost, the cities that make assessments for each, and the percentages of cost assessed. 1 table (2 pages), 1,300 words. Municipal Journal, Feb. 22. 10 cts.

Assessing Paving Costs. Editorial discussion of what would be the most fair and just practice to all concerned. 600 words. Municipal Journal, Feb. 22. 10 cts.

Cost of Highway Maintenance in Washington. A state-regulated, county-administered system of maintenance has been operated since June, 1917; first year's expenditure for maintenance, repairs and equipment totaled $340,188.63 on primary highways. 600 words. Municipal Journal, Feb. 8. 10 cts.

Federal Aid for Highways. Hon. Dr. Reid makes announcement at Eastern Good Roads Ass'n meeting; "first-class roads" will receive "fair and reasonable aid;" all the money provinces can spend. 1,500 words. Canadian Engineer, Feb. 13. 15 cts.

City Streets:

Improving Hillside Streets. Two-level streets, switchbacks and sunken roadways used on San Francisco streets in mounting steep hill sides. 4 ills., 700 words. Municipal Journal, Feb. 22. 10 cts.

Steps Up San Francisco Sidewalks. Built of wood; pedestrians can use either steps or smooth walk. 1 ill., 100 words. Municipal Journal, Feb. 8. 10 cts.

Roads of New York. Historical sketch of the development of the New York State Highway Department, with a review of its organizations and accomplishments. By E. A. Bonney, supervising engr., N. Y. State Dept. of Highways. 11 ills., 4,000 words. Good Roads, Feb. 22. 10 cts.

Street Work in Manhattan. Historical and descriptive sketch of the development of highway operations in the borough originally known as New York City. 3 ills., 2,100 words. Good Roads, Feb. 22. 10 cts.

Highway Work in Four New York Boroughs. A brief resume of the outstanding features of road and street work in the boroughs of Brooklyn, The Bronx, Queens and Richmond. 7 ills., 3,200 words. Good Roads, Feb. 22. 10 cts.

Miscellaneous:

The Brick Highways of Ashtabula County, Ohio. The Dorset brick road a model; 40 miles of brick highway constructed in county since 1916, 62 since 1913. By Ray N. Case, co. engr., Jefferson, O. 17 ills., 2,000 words. Municipal and County Engineering, February. 25 cts.

Bitoslag Pavement in Luzerne County, Pa Notes descriptive of this special construction laid under the supervision of the state highway department. By J. C. Rock, Eastern Paving Co. 2 ills., 1,200 words. Good Roads, Feb. 1. 10 cts.

Make Good on Pavement Construction to Avoid Necessity of Making Excuses for Failure. Attitude of average citizen; cheap pavements please taxpayers only temporarily. By F. A. Churchill, Conneaut, O. 1,100 words. Municipal and County Engineering, February. 25 cts.

City Pavements for State Highways in Connecticut. The Burnside avenue pavement in East Hartford. By Chas. J. Bennett, state highway comr., Hartford, Conn. 800 words. Municipal and County Engineering, February. 25 cts.

Lesson Taught by Road Building Experience in Florida. Quality sacrificed to quantity; licensed engineers; old and new style specifications. By G. R. Ramsey, assoc. mem. Am. Soc. C. E. 1,700 words. Municipal and County Engineering, February. 25 cts.

Effects of Heavy Traffic. Weight of heavily loaded trucks using the main and residence streets in several hundred cities, and damage resulting from such use; increased thickness of base adopted or recommended. 1 table (5½ pages), 1,300 words. Municipal Journal, Feb. 22. 10 cts.

Rochester's Sewer and Paving Specifications. New specifications for pavement, sidewalk and sewer construction adopted by the engineering department for after-the-war work. By James W. Routh, chief engineer Bureau of Municipal Research, Rochester. 2 tables, 2,000 words. Municipal Journal, Feb. 1. 10 cts.

The Construction and Maintenance of the State Trunk Highway System of Wisconsin. Devote less state funds to construction and more to maintenance. By A. R. Hirst, state highway engineer of Wisconsin. 2 ills., 4,500 words. Good Roads, Feb. 8. 10 cts.

Laying Out Wisconsin's Trunk Highways. Discussion of the methods of establishing the Wisconsin trunk highway system, and lessons learned in doing it; total cost to state about $20,000, or $4 per mile. By A. R. Hirst, state highway engineer of Wisconsin. 2,000 words. Good Roads, Feb. 1. 10 cts.

Provisions of Proposed Indiana Highway Law. Summary of the text of a bill introduced in the Indiana senate providing for the establishment of a state highway commission, a state system of highways, and a state highway fund. 2,500 words. Good Roads, Feb. 15. 10 cts.

The American Road Builders' Association. History, aims and officers of the national organization which meets in its 16th annual convention in New York next week. 29 ills., 3,700 words. Good Roads, Feb. 22. 10 cts.

Steam Heated Bitumen Extractor. Made at slight expense and gave satisfactory results in making analyses of asphalt pavement samples, even in cold weather. By C. H. Lovejoy. 1 ill., 300 words. Municipal Journal, Feb. 15. 10 cts.

SEWERAGE AND SANITATION.

Sewerage Desgning:

The Selection of the Value of the Factor "n" in Sewer Design. Definite value not justifiable; determined by construction conditions. By Paul E. Green, member of A. S. C. E. 1,100 words. Municipal and County Engineering, February. 25 cts.

Storm Sewer Extensions at Toronto Harbor. Drainage problems arising from waterfront improvements and how they are being solved. By Geo. T. Clark, designing engr., Toronto Harbor Commission. 4 ills., 2,000 words. Canadian Engineer, Feb. 6. 15 cts.

Sewer Construction:

Some Design and Constructional Features of the Rideau River Intercepting Sewer, Ottawa, Can. Equipment used and cost of labor material and labor; work done by day labor. By L. McLaren Hunter, city engrg. dept., Ottawa. 4 ills., 1,700 words. Municipal and County Engineering, February. 25 cts.

Two Sewer Construction Plants. Portable concrete mixing plant for constructing concrete sewer running parallel and close to a double line of street railway tracks; stationery concrete mixing plant for building 8-foot reinforced concrete sewer. 4 ills., 500 words. Municipal Journal, Feb. 1. 10 cts.

Sewage Treatment:

Sewage Disposal Works in Reconstruction Period. Including three tables of

construction costs, interest, maintenance and operating costs and net city expenditures per capita in 1915. By H. P. Eddy, consulting engr., Boston, Mass. 1,500 words. Municipal and County Engineering. February. 25 cts.

Sewage Treatment in New York. Editorial comment on the use of sub-surface plants, one of which is described in this issue. 300 words. Municipal Journal. Feb. 15. 10 cts.

Sewage Screening Plant in New York City. Completion of the first unit of the general plant of the Metropolitan sewage commission; grit chambers, screens, apparatus for handling screenings and other details of Dyckman street plant. 3 ills., 2,600 words. Municipal Journal, Feb. 15. 10 cts.

Daytona Sewerage Conditions. Studies of sewage screens by Florida State Board of Health; dilution ample; chlorine removes 80 per cent of bacteria; fine screens in use. 8 tables, 1,500 words. Fire and Water Engineering, Feb. 5. 15 cts.

Loss of Head in Sewage Sludge Pipe at Toronto, Ontario. Experiments made on 12-inch cast-iron sludge main after five years of use give value of $n = 0.0168$ to 0.0181. By T. H. Nevitt, supt. of sewage works, Toronto. 1,100 words. Engineering News-Record, Feb. 6. 20 cts.

Sewage Disposal at Manchester. Activated sludge investigations; results of operation at Withington and Davyhulme works; new unit for research. 2,300 words. Canadian Engineer, Feb. 13. 15 cts.

Sanitation:

Rural Sanitation. Of all branches of municipal government, no department receives less consideration than that of health; matters outlined which would be of material benefit. By Thos. Watson, chief provincial sanitary inspector, Saskatchewan. 3,700 words. Western Municipal News, February. 10 cts.

Sanitation in Emergency Shipyards. Safeguarding against influenza; collection and disposal of wastes; fly and mosquito extermination; water supply. 3 ills., 2,000 words. Municipal and County Engineering, February. 25 cts.

Miscellaneous:

A Critical Study of the Bacterial Count in Water and Sewage. Table of comparison of the characteristics of error series in bacteriological tests with those of common statistics and mathematical series. By M. F. Stein, designing engr., Div. of San. Engrg., Cleveland, O. 2 charts, 1 table, 3,200 words. Engineering and Contracting. Feb. 12. 15 cts.

Soil and Drainage Pipes for Buildings. Investigation recently made by Wm. Paul Gerhard, C. E., of New York, to determine the comparative value of different kinds of material for drainage, soil and vent pipes for buildings. 2 ills., 2,800 words. Engineering World, Feb. 1. 15 cts.

San Francisco's Sewage System. Includes a reinforced concrete pumping plant recently completed; city is divided into two main drainage districts. By W. A. Scott. 4 ills., 2,200 words. Engineering World, Feb. 1. 15 cts.

Auto Catch-Basin Cleaning Truck. Cambridge, Mass., has constructed such a machine for cleaning out and removing the material from its street catch-basins; in service six months; excavating and loading done by means of an orange-peel excavating bucket. 1 ill., 400 words. Canadian Engineer, Feb. 6. 15 cts.

WATER SUPPLY.

Water Works Systems:

The Waterworks and Sewerage of Buenos Aires, Argentina. Past and present waterworks and sewer system; reinforced concrete sewer built on slipway and launched. By Allan B. Lea. 5 ills., 1,700 words. Engineering and Contracting. Feb. 12. 15 cts.

The Kansas City Waterworks. Many extensive improvements and extensions planned for the coming year by the water department; at least $2,000,000 needed for projected filters and other extensions. 4 ills., 1,000 words. Fire and Water Engineering, Feb. 12. 15 cts.

Water Supply of San Francisco. Describing the proposed Hetch Hetchy water supply plan which is now in progress of construction and which will cost in the neighborhood of $45,000,000. 600 words. Fire and Water Engineering, Feb. 5. 15 cts.

Waterworks Operation:

Waterworks Operation — Reservoir Maintenance. Drawing off foul bottom water; removing vegetation from exposed bottom; preventing and destroying algae. 2,600 words. Municipal Journal, Feb. 1. 10 cts.

Waterworks Operation: Reservoir Maintenance. Collection of sediment in reservoirs and methods of removing it; flushing out, pumping, wheelbarrows and wagons, and dredges. 1 ill., 2,500 words. Municipal Journal, Feb. 8. 10 cts.

Office Records of the St. Louis Water Division, Distribution Section. For distribution purposes, the city is divided into six districts, each having a station building with a station foreman in charge. From the December Journal of American Waterworks. 2,600 words. Canadian Engineer, Jan. 30. 15 cts.

Making Water Analyses. Reason why analyses are desirable; chemical, bacteriological and physical; private or municipal laboratories; suggestions for taking samples and analyzing. 2,500 words. Municipal Journal, Feb. 15. 10 cts.

A Syphon Reservoir Blow-Off. For wasting bottom water from Rio Grande reservoir, canal zone; bottom water rendered foul by organic matter; analyses showing improvement resulting from use of syphon. By Geo. C. Bunker, in charge of Canal Zone water purification and laboratories of Municipal Engineering Division. 1 ill., 1,300 words. Municipal Journal, Feb. 1. 10 cts.

Rainfall Records. Some practical uses that this important data can be put to; remarkable variation records in nearby sections; numerous rain gauges in various portions of the country should be established. By L. M. Hastings, city engr., Cambridge, Mass. 2,000 words. Fire and Water Engineering, Feb. 19. 15 cts.

Pumping:

Economic Value of Electrically Driven Pumps for Small Waterworks. Advantages of electric motive power; surface pumping. By D. D. Ewing, prof. of electric railway engineering, Purdue University, Lafayette, Ind. 2,500 words. Municipal and County Engineering, February. 25 cts.

Electrically Driven Pumps in Small Waterworks. Advantages of electric motive power for driving pumps; power requirements; cost of changing to electrically driven pumps. By D. D. Ewing, prof. of electrical railway engrg., Purdue University. 1,700 words. Engineering and Contracting, Feb. 12. 15 cts.

Lynn Water Commissioner. Reeves J. Newsome, elected by city council, describes two new pump installations made for his department; head cut from 45-foot to 27-foot, with a saving of $8,000 for year's pumping. 1 ill., 1,000 words. Fire and Water Engineering, Feb. 19. 15 cts.

Metering:

Financial Benefits of Metering. Interesting information of benefits both to the consumer and the city given in the last annual report by Geo. H. Fenkell, gen. mgr. of the Board of Water Comrs., Detroit, Mich. 1,300 words. Engineering and Contracting, Feb. 12. 15 cts.

Selection for Service Meters. Controlling principles involved in determining size and make should be economy and efficiency; oversizing a common fault. By W. R. Edwards, assistant supt., Passaic, N. J., Water Co. 1,100 words. Engineering and Contracting, February 12. 15 cts.

Measuring and Recording Deliveries of Irrigation Water to Farms. Abstract of an article by J. S. Longwell, ass't engr., U. S. Reclamation Service, on the importance of these measurements to the water users and project interests, together with a discussion by D. C. Henny, consulting engr., U. S. Reclamation Service. 2,000 words. Engineering and Contracting, February 12. 15 cts.

Purification:

The Chlorination of Water Supplies. Chicago's famous Bubbly Creek water filtration process on a large scale in this country. By Wm. J. Orchard, Wallace & Tiernan Co., N. Y. 2 ills., 1,600 words. Engineering World, February 1. 15 cts.

Features of Present-Day Water Purification Practice. A non-technical review written for municipal officials. By Milton F. Stein, civ. engr., Chicago. 4 ills., 4,000 words. Municipal and County Engineering, February. 25 cts.

St. Louis Water Purification Plant. Excerpts from report of chief chemist August V. Graf, for 1918; interesting details of the operation of the plant; river water highly colored and turbid; water said to be safe to consumers. 1 table, 1,600 words. Fire and Water Engineering, February 5. 15 cts.

Removal of Iron and Manganese from Water Supply of Wausau, Wis. Removal by aeration and filtration recommended by W. G. Kirchoffer, consulting engr., Madison, Wis., in a report submitted last December. 1,000 words. Engineering and Contracting, February 12. 15 cts.

The Chloramine Process. A description of its application to the Catskill (Esopus) water of New York City's water supply; what the process consists of. By Frank E. Hale, Ph. D., dir. of laboratories. dept. water supply, gas and electricity, N. Y. C. 3 ills., 3 tables, 2,500 words. Fire and Water Engineering, February 26. 15 cts.

Miscellaneous:

Reinforced Concrete Pressure Pipe. Concrete properly made and sufficiently reinforced will resist safely stresses up to 100 pounds to square inch; new type of joint illustrated; method of manufacture of the pipe. By Coleman Meriwether, from a paper read before the Illinois section of the American Waterworks Ass'n. 2 ills., 1,800 words. Fire and Water Engineering, February 12. 15 cts.

Liner Plates for Hydraulic Tunnel. Steel liner plates, which eliminate the necessity for tunneling shield; tunneling can be made continuous on account of maximum amount of clearance obtainable; unnecessary for gangs to wait for each other. By Frank C. Perkins. 2 ills., 400 words. Fire and Water Engineering, February 5. 15 cts.

Successful Operation of the State Water Code of Oregon. Shows a saving in time and water to irrigator; function of state water board, state engineer and water master. By Percy A. Cupper, state engr., Salem, Ore. 2,100 words. Engineering News-Record, February 27. 20 cts.

Shooting Water Wells with Nitro-Glycerin. Nitro-glycerin put to a novel yet practical use at Twin Bridges, Del., when 150 qts. were exploded in a drilled water well. By Thos. M. Knight. 1 ill. 500 words. Engineering and Contracting, February 12. 15 cts.

A 4,000,000-Gallon Reservoir. Description and illustration of the construction of a reinforced reservoir and coagulation plant at St. Louis for the Anheuser-Busch brewery. 1 ill., 1,600 words. Engineering World, February 1. 15 cts.

Saving Effected by Detroit Water Board by Using Excavating and Pipe Laying Machinery. 3 ills., 300 words. Engineering and Contracting, February 12. 15 cts.

STREET LIGHTING AND POWER PLANTS.

Water Power Development:

Development of Hydroelectric Resources in Eastern United States. Deterring influences and development are outlined; brief review of what has already been accomplished; urgent need and benefits of hydroelectric developments. By D. H. Colcord, Westinghouse Electric & Manufacturing Co. 4 ills., 3,000 words. Electrical Review, February 8. 30 cts.

Development of Massachusetts Water Power. Special commission appointed to investigate the facilities and possibilities in this direction urges action; public ownership is declared to be of doubtful value as a water-power policy. 1 ill., 2,000 words. Electrical World, February 8. 15 cts.

Water Power Administration in Canada. Summary of 14 articles of existing laws, regulations and practices in common to each of the four Canadian jurisdictions, Quebec, Ontario, Prairie provinces and territories, and British Columbia. By H. W. Grunsky, B. A., B. C. L. 3,000 words. Canadian Engineer, February 13. 15 cts.

2,305,310 H. P. Developed from Water in Canada. That is the installed capacity of Canadian hydroelectric plants according to census just completed by Ottawa authorities; installation of additional units in present plants would add 530,000 H. P.; Queenstown and other developments under way not included. 1,400 words. Canadian Engineer, January 30. 15 cts.

Power Plants:

Power Development at Drummondville, P. Q. Southern Canada Power Co. is building concrete dam, 1,700 ft. long, extending diagonally into St. Francis river, and new power house with capacity of 18,000 h. p.; 3,500 h. p. vertical units, 32 ft. head. 7 ills., 1,500 words. Canadian Engineer, January 30. 15 cts.

Simplicity Marks Michigan's Largest Hydroelectric Development. Simplicity of layout, co-ordination of turbines installed to water flow and 140,000-volt transmission line, mark development at Junction dam. 6 ills., 2,200 words. Electrical Review, February 1. 30 cts.

Central Electric Power Station Statistics. Analysis of data gathered by Dominion water power branch and bureau of statistics; primary power, kinds and how distributed; review of commercial and municipal stations; capital invested, salaries and wages. 10 tables. 1,200 words. Canadian Engineer, February 6. 15 cts.

Use of Electricity:

Heating by Electricity. Presentation of principles of heating residences, which prove the impracticability of ever employing this agency in general practice. 800 words. Municipal Journal, February 8. 10 cts.

Association of Electrical Inspectors Discusses Post-War Problems. 14th annual meeting considers timely inspection problems; conservation through standardization of electrical devices; legal status of electrical rules; combined fire and safety code. 3 ills., 7,500 words. Electrical Review, February 1. 30 cts.

Gas:

The Place of Research in the Gas Industry. Little progress in last hundred years in the zone of potential variations; universal carbonization; gas as secondary product; possibilities of hydrogenation and sulphur. From paper by S. W. Carr, prof. of applied chemistry, University of Ill. 2,500 words. Gas Age, February 1. 20 cts.

Operation of Buenos Aires Gas Plant. South American gas works affected by the shortage of coal. 1 ill., 800 words. Gas Age, February 1. 20 cts.

Ammonia Plant at the Stockholm Gas Works. Description of a modern ammonia and ammonium sulphate plant of latest Swedish design. 5 ills., 1,600 words. Gas Age, February 1. 20 cts.

Miscellaneous:

Photographic Study of Porcelain Insulators. Polarized light employed in examination of thin sections of insulators some of which had been properly fired while others were underfired and still others overfired. By Harold G. Tufty, research dept., University of Wisconsin. 3 ills., 3,000 words. Electrical World, February 8. 15 cts.

Liability of Central-Station Company for Failure of Electric Power. Several decisions covering the question of power failure, both through negligence of employes of utility company and through breach of contract. By Chesla C. Sherlock. 1,400 words. Electrical Review, February 8. 30 cts.

FIRE DEPARTMENT.

Drills and Training. Importance of the education of members of fire departments in the details of their profession; necessity for and forms of drills; the problem of fire education in small cities and towns. By J. R. Young, insurance comr. of North Carolina. 1 ill., 1,800 words. Fire and Water Engineering, February 26. 15 cts.

The Flying Squadron System. An innovation which has been found particularly valuable where two-platoon systems have been installed without appreciable increase in personnel; Detroit the pioneer in its adoption. By Chas. E. Meek, New York, asst. member I. A. F. E. 1,300 words. Fire and Water Engineering, February 12. 15 cts.

The Oklahoma Bill. Measure introduced in Legislature for state-wide two-platoons. 800 words. Fireman's Herald, February 1. 10 cts.

Oil Fuel for Steam Fire Engines. Advantages claimed for crude oil as fuel over coal; great improvements in methods of using the liquid fuel; circular gravity feed burner. By Chief Wm. C. Kerholtz, fire department, Fresno, Cal. 1,000 words. Fire and Water Engineering, February 5. 15 cts.

Central Fire-Alarm Station of San Francisco. Unusually complete equipment and many unique features to guard against fire hazard; special provision to insure reliability of power supply and interchangeability of circuits; method of operating. 7 ills., 3,300 words. Electrical Review, February 22. 10 cts.

Protecting Fire Hydrants Against Freezing in Winnipeg. Despite severe climatic conditions the firemen have never found a hydrant out of commission when required; due primarily to a system of daily inspection in congested areas, bi-weekly and tri-weekly in other portions of the city. 600 words. Engineering and Contracting, February 12. 15 cts.

Fire Prevention in the Factory. Importance of daily and weekly inspection; fire pails should be easily seen and accessible; automatic shut-off valves for oil system; private fire alarms and departments. By Geo. H. Greenfield, member N. F. P. A. 6 ills., 3,500 words. Fire and Water Engineering, February 19. 15 cts.

Clean-Up and Paint-Up Campaigns. They help to reduce the fire hazard; in Cincinnati fire loss cut down $900,000 in a single year; many other cities adopt plan. 1 ill., 700 words. Fire and Water Engineering, February 26. 15 cts.

TRAFFIC AND TRANSPORTATION.

Traffic Regulations and Their Value. A discussion of the function and results of traffic regulations, with a review of the work of standardization undertaken by the Highways Transport Committee. By Wm. P. Eno, chairman. 1,500 words. Good Roads, February 22. 10 cts.

Regulation of the Speed, Weight, Width and Height of Motor Trucks and Trailers. Abstract of paper presented at the meeting of the American Ass'n of State Highway Officials, by George Graham, chairman, Motor Truck Committee, Nat. Automobile Chamber of Commerce. 2,300 words. Canadian Engineer, February 6. 15 cts.

Work of the Highways Transport Committee. Authorized statement by the Council of National Defense on the post-war program of its transportation committee. 1,100 words. Good Roads, February 1. 10 cts.

Motor Truck Costs Much Higher Than Generally Assumed. Data collected by Motor Truck Ass'n show high average operation expense; new cost system to be recommended. 800 words. Engineering News-Record, February 27. 20 cts.

Bridgeport Well Pleased with Safety Cars. Pioneer safety-car service in East was inaugurated on February 2 on nine-car line through business section of city; special precautions taken to safeguard initial service to insure freedom from interruption. 6 ills., 3,000 words. Electric Railway Journal, February 8. 15 cts.

Application No. 3808. History of San Diego electric railway told in this request for relief made to California railroad commission proves that rectitude affords no guarantee that income will exceed outgo. 1 ill., 7,000 words. Electric Railway Journal, February 8. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning Methods. Sweeping by machine and hand, flushing and sprinkling, and other street cleaning operations discussed in report of Rochester Bureau of Municipal Research; patrol routes; equipment and its use. 5 ills., 3,800 words. Municipal Journal, February 8. 10 cts.

Street Cleaning Methods. Machine sweeping; where and when used to advantage; construction of sweeper; operation in batteries; cost. 3 ills., 1,700 words. Municipal Journal, February 15. 10 cts.

Refuse Disposal in Winnetka. New plan inaugurated in 1917, using municipally owned equipment specially designed for the purpose, and operated by collectors reporting directly to the village office. 200 words. Municipal Journal, February 1. 10 cts.

Baltimore Garbage Will Be Made Into Pork. Contractor will pay city three and a half time as much per ton as Chicago top price for market hogs, thus eliminating gambling risk to both parties; change from disposal by reduction. By Walter E. Lee, water engr. of Baltimore. 2,100 words. Engineering News-Record, February 6. 20 cts.

Snow Rolling in Laconia. Description of snow roller used in Laconia, N. H., for several years. From information furnished by the city engineer, Chas. A. French. 1 ill., 500 words. Municipal Journal, February 8. 10 cts.

STRUCTURES AND MATERIALS.

Engineering Problems in Viaduct Construction. The new viaduct will reduce the extreme congestion in traffic at 42d st and Park ave. By Harry Gardner. 2 ills., 2,200 words. Engineering World, February 1. 15 cts.

Empirical Column Formulae for Brick Piers. Tests at University of Toronto on piers of various lengths built of brick of known strength to determine effect of slenderness ratio on strength of the piers; detailed report of tests on 14 piers and 62 individual brick. By Wm. W. Pearse, city archt. and supt. of bldg., Toronto. 4 ills., 1 table, 2,000 words. Canadian Engineer, February 20. 15 cts.

Flood Strikes Centers in 12 Days. But does no damage to big reinforced concrete truss bridge over Etobicoke river on Toronto-Hamilton highway. 2 ills., 300 words. Canadian Engineer, February 13. 15 cts.

Mammoth Derricks Build Concrete Outlet for Lockington Dam. Gravel from excavation washed ond screened for concrete; all operations mechanical from pit to forms. 2 ills., 1,000 words. Engineering News-Record, February 13. 20 cts.

Sheet Piling and Forms Used at Troy Dam and Locks. Eight different cofferdam operations; type of piling specially suited to cellular work; steel and wooden forms used. 7 ills., 3,800 words. Engineering World, February 1. 15 cts.

Operating Details of an Electrically Operated Cement Mill. Progress of material through mill; process of cement manufacture; apparatus and size of motors utilized. 4 ills., 3,200 words. Electrical Review, February 8. 30 cts.

GOVERNMENT AND FINANCE.

Why the Commission-Manager Form Is Preferable to the Commission Form of Government. From a paper prepared for the last annual convention of the League of Pacific Municipalities. By R. E. Bosshard, city clerk and ass't city mgr., Alameda, Cal. 2,500 words. Engineering and Contracting, February 12. 15 cts.

Needed Revision of Public Improvement Bond Laws. Proper revision of the statutes will greatly benefit cities and towns; principle of limited tax rate should be discarded. By I. E. Dierdorff, Davenport, Ia. 1,300 words. Engineering and Contracting, February 12. 15 cts.

Increasing Municipal Revenues. Editorial discussion of the serious problem presented to most cities, due to the loss of revenue from liquor licenses and the general upward trend of municipal expenses. 600 words. Municipal Journal, February 8. 10 cts.

Increasing Municipal Revenue. Why higher per capita revenues are necessary; methods employed by the larger cities of the country for increasing revenue; delinquent taxes; exemptions; license taxes on various kinds of business. 1 ill., 4,200 words. Municipal Journal, February 15. 10 cts.

Comparison of Various Existing and Proposed License Laws. Form suggested by joint committee of national societies in 1915 used as a basis in several states, many societies are working on legislation. 8,500 words. Engineering News-Record, February 27. 20 cts.

MISCELLANEOUS.

Town Planning. First question to be considered is its industry, which is the condition of its being; health, convenience, beauty, are the conditions of its well-being; problems of housing and growth; question of air space. By Thos. Adams, town planning adviser, Commis-

(Continued on page 214)

NEWS OF THE SOCIETIES

March 25, 26.—AMERICAN WATER WORKS ASSOCIATION, ILLINOIS SECTION. Eleventh annual meeting, Urbana, Ill. Secretary, G. C. Habermeyer, acting chief, State Water Survey, Urbana.

April 14-19.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Mineral Wells, Tex. Secretary, F. A. Rountree, Birmingham, Ala.

April 25-26.—AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE, Annual meeting, Philadelphia, Pa. Secretary, J. P. Lichtenberger, Logan Hall, West Philadelphia, Pa.

June 9-13.—AMERICAN WATER WORKS ASSOCIATION. Thirty-ninth annual convention, Iroquois Hotel, Buffalo, N. Y. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Bloomington, Ill.

AMERICAN ROAD BUILDERS' ASSOCIATION.

Mr. Pinckney's subject on Wednesday morning (as stated in last week's issue) was "Foundations for Heavy Horse-Drawn and Motor-Truck Traffic." By means of screen views he showed the great increase in heavy traffic in recent years in New York streets—traffic reaching 300 to 400 tons per foot of width of street per eight-hour day. He said, however, that what is underneath a pavement is almost as important as what goes over it. He showed pictures of the intricate systems of ducts and mains underlying Manhattan streets, and pointed out that the street foundation must allow of access to sub-surface structures. Describing methods in Manhattan, he said that out of 400 miles of streets for heavy traffic 2 miles have macadam foundations, 154 have old stone and 304 miles have concrete. Macadam and stone, he found, were not satisfactory foundations for heavy traffic because they do not offer sufficient resistance. The concrete foundations are six inches deep, 1: 3: 6 mix. He discussed the advisability of increasing the depth, estimating that it would cost $100,000 a year more to add one inch and $180,000 more for two inches, 400,000 square yards being repaved annually. He found that only 0.05 per cent of failure (yardage) could be ascribed to disturbance of sub-surface in 1916 and 0.08 per cent in 1918. These failures cost $30,000 a year, so that increasing the depth would be uneconomical. He asserted that the great cause of failure was cutting, 150,000 yards of concrete foundation having been cut by openings in 1918, while only 7,900 yards failed for other reasons. He therefore urged the installation in all growing cities of adequate pipe galleries. He also took up failures due to drainage.

Mr. Goodsell (New York City) added to the figures given in the paper. He said that New York City has 100 miles of streets carrying traffic greater than 100 tons per foot of width per eight-hour day. Fifth avenue carries 250 tons in summer and 550 in winter.

Resolutions.

At the final Friday afternoon session, following a business meeting, the resolutions committee presented its report on resolutions brought up during the convention, and the following were adopted:

Freight Rates on Road Materials.

Whereas, The resumption, stabilization and progress of all business activity depends upon the quality and economy of transportation service afforded by the highways, railways and waterways, and

Whereas, lack of parity of these agencies exists due to the serious neglect of our highways, therefore be it

Resolved, That it is necessary to the welfare of the country that the highways be improved to supplement railroad efficiency and to meet present needs, and that to do this, railway transportation for road materials must be employed for the movement of a very large tonnage.

Resolved, That it is in the public interest that freight rates for the movement of road materials should be so readjusted as to permit adequate distribution of the materials essential to road improvement which will furnish employment for many thousands of men who might otherwise find themselves without work.

Stimulation of Road Building.

Whereas, there exists an immediate and pressing need for the absorption of labor during the period of transition from war to peace activities, and

Whereas, the Department of Labor through its several divisions is doing all in its power to stimulate immediate construction of good roads, and has called upon industry to cooperate with it in its reconstruction campaign,

Now Therefore, Be It Resolved: That the American Road Builders' Association does heartily endorse the efforts of the Department of Labor.

Motor Vehicle Limits.

Resolved: That the American Builders' Association favors the following regulations of motor trucks on the public highways.

1. The gross weight of vehicle and load shall not exceed 28,000 lbs. on four wheels.
2. The total height shall not exceed 12 ft. 2 in.
3. The total width shall not exceed 96 in.
4. The total length shall not exceed 28 ft.
5. The total weight per inch width of tire (measured at the base of rubber) shall not exceed 800 lbs.
6. The speed of motor trucks and trailers entirely equipped with solid rubber tires shall not exceed 15 miles per hour, and be it further

Resolved: That the secretary be and hereby is directed to forward copies of this resolution to the governors, state legislatures and the state highway commissioners.

National Highway Commission.

Whereas, The President of the United States in his recent message to Congress, recognized the value of improved highways in the general transportation system of the nation and definitely recommended and urged their rapid development; and

Whereas, This work is necessary to give employment to our returning soldiers and also to furnish worthy projects on which unemployed labor can be engaged during the period of readjustment, and

Whereas, We recognize the necessity for a well defined and connected system of improved highways in order to expedite the distribution of large volumes of foodstuffs now wasted on account of the lack of prompt and adequate highway transportation and to better serve the economic and military needs of the nation.

Therefore, Be It Resolved: That a National Highway Commission be created to promote and guide this powerful economic development of both highways and highway traffic and establish a National Highway System.

Be It Further Resolved: That the present appropriations for federal aid to the states be continued and increased and the states urged to undertake extensive highway construction so as to keep pace with the development of this country and its transportation needs, and in carrying out the provisions of the present Federal Aid Act or any amendment thereto that the National Highway Commission when created shall cooperate with the State Highway Departments.

Be It Further Resolved: That all federal government activities with respect to highways be administered by the National Highway Commission.

Resolutions of Thanks.

Resolved, That the American Road Builders' Association, in convention assembled, does hereby express its deep feeling of appreciation of the courtesies extended to it by the State and City of New York, the Bureau of Highways of the Borough of Manhattan, the Fifth Avenue Coach Company, the Hotel McAlpin and the Merchants' Association of the City of New York, and the active cooperation of the American Automobile Association, the Highway Industries Association, the Motor Truck Association of America, the National Highways Association, the National Highway Traffic Association and the public press.

Resolved: That the American Road Builders' Association, in convention assembled, does hereby express its sincere appreciation of the entertainment provided on the occasion of the annual dinner of the association at the Waldorf-Astoria Hotel by the local entertainment committee, composed primarily of manufacturers of road machinery and materials.

Resumption of Road Building.

Resolved: The American Road Builders' Association emphatically favors the immediate extensive and comprehensive resumption of road building by municipalities, county, states and the nation.

Return of Highway Engineers in France.

Whereas, Immediate and extensive resumption of highway construction will materially aid in solving the labor and transportation problems and

Whereas, Large sums of money have been appropriated, definite and comprehensive plans have been prepared and the only serious drawback to road building on a large scale is the lack of capable road engineers, contractors, foremen and experienced superintendents of construction, and

Whereas, Great numbers of highway builders patriotically enlisted and are now overseas, therefore be it

Resolved: That a committee of three be appointed representing the American Road Builders' Association to urge the Secretary of War to take all necessary steps to hasten the demobilization of engineering units, including the 23rd, 28th, 41st, 42d, 43d and 101st Engineers and facilitate their quick return, that they may lend their invaluable and indispensable aid to arts of peace, thus insuring the efficient expenditure of the highways funds of the cities, counties, states and the nation.

"Roosevelt Road."

Resolved, That a great highway, to be known as the "Roosevelt Road," traversing his native state of New York should be constructed to accommodate the rapidly increasing traffic; this road to be built in such location as will permit easy grades and alignment, to have a paved surface not less than 22 feet, and to be provided with a foundation which will sustain present and future traffic.

Increased Federal Aid.

Whereas, The American people keenly sense the important place occupied by the transportation question in the great problems of reconstruction and extended national development; and

Whereas, The American people are sharply impressed not only with the many advantages arising from good roads, but particularly with the enormous economic losses due to bad roads; and

Whereas, The United States is the richest of all nations, yet in four years the national debt has increased twenty-five fold and the carrying charges of this

gigantic liability leaves this country less able than ever before to sustain the burden of bad roads, and the above mentioned obligations, together with high prices, are an unanswerable argument not for a postponement or curtailment of the road building program, but rather for a more aggressive, more extended and more comprehensive plan of highway transportation, involving vastly increased appropriations; therefore, be it

Resolved, That the American Road Builders' Association at its sixteenth convention express its satisfaction with the patriotic action of the Congress of the United States in the $200,000,000 increase in the federal aid highway scheme and in the action of many states, counties and cities, some of which have already provided large funds and others of which are conducting active campaigns for rda building purposes.

Improved Types of Highways.

Resolved: That all state and county highway governing bodies be urged to advocate, whenever necessary, new appropriations and to extend road system of wider, more durable and approved types, in order to keep pace with the intensified and multiplied highway transport requirements of today and tomorrow.

THE TENTH NATIONAL GOOD ROADS EXHIBIT.

The "show" was attractive and made a fine showing considering the limitation of exhibits to such as could be shown in the hotel. The display was arranged in the Winter Garden of the hotel, on the same floor as the meetings. All the exhibitors distributed descriptive literature. The following is a list of exhibitors:

Acme Road Machinery Co., Frankfort, N. Y.

Amies Road Co., Easton, Pa.—Specimens, slabs of Amiesite road, photographs,, etc.

Barber Asphalt Paving Co., Philadelphia, Pa.—Strikingly effective photographs of Trinidad asphalt pavements; literature describing Iroquois equipment, including portable asphalt mixing plants, tandem rollers, asphalt kettles and tools, etc.

Barrett Co., New York, N. Y.—Photographs of Tarvia roads; samples.

Bitoslag Paving Co., New York, N. Y.—Specimen slabs of Bitoslag and Bitosan pavements; photographs; interesting and useful souvenirs.

Blaw-Knox Co., Pittsburgh, Pa.—Steel forms for concrete road, sidewalks, curb and curb and gutter construction.

Burch Plow Works Co., Crestline, O.—Working models of stone spreader, loader and unloader and of culvert pipe. The spreader has performed the labor of six to eight men on actual work. The loader unloads direct from railroad car to motor truck.

John F. Byers Machine Co., Ravenna, Ohio.

Philip Carey Co., Lockland, Cincinnati, Ohio.

Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio.

Franklin Contracting Co., New York, N. Y.—Specimen slabs of "National" pavement; samples of soils from which "National" pavement aggregate may be made; photographs.

Good Roads Machinery Co., Kennett Square, Pa.

Granite Paving Block Manufacturers Association of U. S., Boston, Mass.

W. & L. E. Gurley, Troy, N. Y.—All types of surveying instruments, including transits, levels, compasses, rods, sketching cases, etc.

Hastings Pavement Co., New York, N. Y.

Headley Good Roads Co., Philadelphia, Pa.—Photographs of pavements; samples of asphalt patch material.

Hercules Powder Co., Wilmington, Del.

Ingersoll-Rand Co., New York, N. Y.

Keuffel & Esser Co., New York, N. Y.—Surveying instruments of all kinds, including transits and levels, drafting instruments; samples of tracing paper; solar ephemeris and data book.

Keystone Driller Co., New York, N. Y.

Kinney Manufacturing Co., Boston, Mass.—The Kinney asphalt pump for handling asphalts; literature describing all types of Kinney pumps, auto distributors, heaters and distributors, street flushers, tar and asphalt spraying nozzles, pressure head sprayers, strainers, etc.

Koehring Machine Co., Milwaukee, Wis.—Moving pictures of Koehring concrete mixers and other equipment at work. These drew a big audience all the time and proved a very effective way of taking the crowd out on the job at very little expense and trouble.

Novo Engine Co., Lansing, Mich.

Portland Cement Association, New York, N. Y.

Standard Oil Company (New Jersey), New York, N. Y.—Photographs of streets and roads.

Standard Oil Company (New York), New York, N. Y.—Specimens of asphalt; souvenir memorandum books.

Texas Company, New York, N. Y.—Samples of Texaco asphalt; striking photographs of asphalt pavements; paving fillers.

Thew Automatic Shovel Co., Lorain, O.

United States Asphalt Refining Co., New York, N. Y.—"Aztec" asphalt pavements; photographs; souvenirs.

Warren Brothers Company, Boston, Mass.—Specimen slabs of Bitulithic and Warrenite pavements; photographs. This exhibit had a commanding place in the show.

White Company, Cleveland, O.

Willite Road Construction Co. of New York, New York, N. Y.—This exhibit was distinguished by being the only one presided over by a lady, who proved that the highway business is not only a man's business. There were displayed photographs and advertisements of Willite pavements and specimen slabs, soils, etc. The souvenirs were the kind that are kept, being a splendidly illustrated and printed edition of Pershing's own story of the A. E. F. in France.

Wyoming Shovel Works, Wyoming, Pa.

L. A. Young Industries, Inc., Detroit, Mich.

H. H. Robertson Co. (formerly Asbestos Protected Metal Co.), Highway Materials Dept., Pittsburgh, Pa.—Samples of paving joint and reinforcing for concrete roads.

Berger Manufacturing Co., Canton, O.—Metal culverts; filing cabinets of steel.

Connery & Co., Inc., Philadelphia, Pa.—Literature describing all kinds of asphalt heaters.

Contractors Service Co., New York.

MUNICIPAL INDEX

(*Continued from page 212*)

sion of Conservation. 2,800 words. Canadian Engineer, February 13. 15 cts.

Town Planning in Canada. Outline of the work of Commission of Conservation; relation to housing and land problems. By James White, deputy head, Commission of Conservation, 1,700 words. Canadian Engineer, February 6. 15 cts.

What About the Government Housing Program? Engineers should be active in study of housing in general and of solution of the problem of disposing of those government projects already under way. By Morris Knowles, chief engr., div. of transportation and housing, U. S. Shipping Board, Philadelphia. 2,800 words. Engineering News-Record, February 13. 20 cts.

Developing Ambition and Confidence in Employes. Discussion of some of the elements which enter into success and the stimulation of ambition, by the general manager of the Niagara Light, Heat and Power Co., George Wehrle, 1 ill., 2,600 words. Gas Age, February 1. 20 cts.

Operating an Employment Bureau for Civil Engineers. How a technical society conducts a registration office; tries also to place employed, but not satisfied men. By C. S. Rindsfoos, chairman, registration bureau, Cornell Society of Civil Engrs., N. Y. C. 1,100 words. Engineering News-Record, February 6. 20 cts.

The Economic Duties of the Engineer. He should saturate himself with sound economic doctrine; just as much the basis of his professional work as the sciences of physics and chemistry. From presidential address delivered before the Mining and Metallurgical Society of America, by W. R. Ingalls. 1,500 words. Engineering and Contracting, February 19. 15 cts.

The Economic Duties of the Engineer. In the presidential address before the Mining and Metallurgical Society of America, January 14, W. R. Ingalls presented a discussion of the present duties of engineers in relation to economic problems of the future; parts concerning civil engineers most directly are here reproduced. 4,200 words. Engineering News-Record, February 6. 20 cts.

General Professional Meeting at Ottawa. Combined with annual meeting of the Engineering Institute of Canada; report of proceedings; addresses by the governor-general, minister of public works and others; discussions on highways, hydroelectric ice troubles and railway electrification. 4 ills., 20,000 words. Canadian Engineer, February 20. 15 cts.

Specifications for Public Works. Editorial comment on the faultiness of specifications, the lack of logical or intelligent arrangement of the parts of the specification and the inexact or improper use of the language employed to express the ideas. 700 words. Municipal Journal, February 1. 10 cts.

Reclamation of Swamp Lands in Dane County, Wisconsin. 14 drainage districts organized; costs; seven-foot pond changed to corn field. By W. G. Kirchoffer, sanitary and hydraulic engr., Madison, Wis. 2,000 words. Municipal and County Engineering, February. 25 cts.

Methods and Cost of Riprapping Embankment by Wire Bag Method. 1 ill., 500 words. Engineering and Contracting, February 12. 15 cts.

Portable Stone Crusher Saves Cost Every Year. Omaha company crushes 935 cu. yd. of stone in a period of six months at an actual saving of $1,500. 1 ill., 400 words. Electric Railway Journal, February 8. 15 cts.

How the New York Canal Concrete Barge is Being Built. In four yards independently at work on same type of boat differences may be noted in yard layout, launching schemes, form construction and steel placing. 19 ills., 4,500 words. Engineering News-Record, February 6. 20 cts.

Long Beach Municipal Markets. Outdoor markets and fish market pay all expenses from small fees charged. 900 words. Municipal Journal, February 1. 10 cts.

City and County Engineers Write of Construction Projects Planned to Provide Buffer Employment for Labor during Readjustment Period. 20,000 words. Municipal and County Engineering, February. 25 cts.

Work as a Coagulant. Editorial discussion, recommending work as the best means of settling the social and industrial unrest, following the most violent and protracted storm of history. 800 words. Municipal Journal, February 15. 10 cts.

Opportunity Is Here: Let Us Meet It. We must grapple with the problems involved in transition from an old order to a new order and forge ahead with the conviction that success will attend our efforts. By L. K. Comstock, 2,400 words. Electrical World, February 8. 15 cts.

Performing Municipal Construction Work by Day Labor in Flint, Mich. Relative costs; contact versus day labor system. By Ezra C. Shoecraft, city engr., Flint. 1,500 words. Municipal and County Engineering, February. 25 cts.

Civil War Price Trends Compared with Those Today. Judging by past, prospect is that high prices will continue; should not retard immediate building. By Morris Knowles, engr., Pittsburgh, Pa. 2 ills., 1,500 words. Engineering News-Record, February 27. 20 cts.

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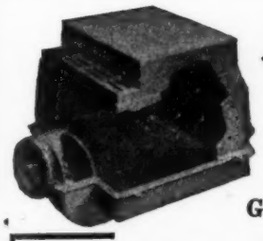

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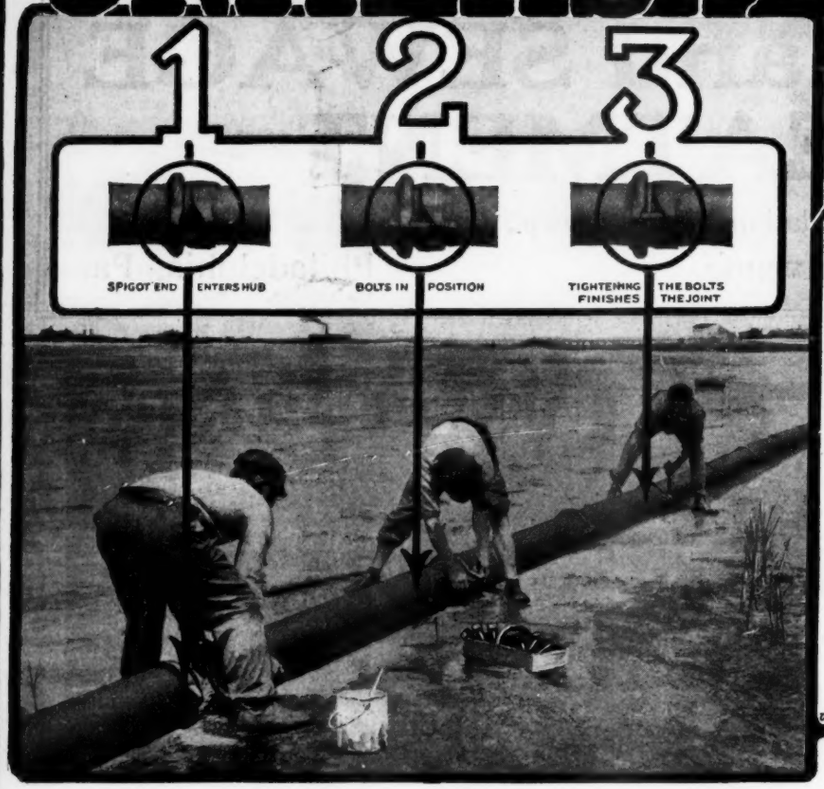

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